PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-196965

(43)Date of publication of application : 14.07.2000

(51)Int.Cl. H04N 5/335
H01L 27/148
H04N 5/253

(21)Application number : 10-374083

(22)Date of filing : 28.12.1998

(71)Applicant : FUJI PHOTO FILM CO LTD

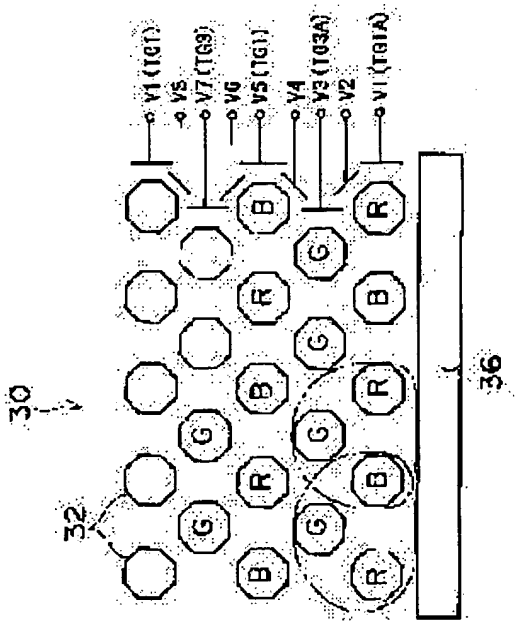
(72)Inventor : ISHIHARA ATSUHIKO
ODA KAZUYA

(54) CCD IMAGE PICKUP DEVICE, METHOD FOR DRIVING IT, AND FILM SCANNER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a CCD image pickup device which can make the generation of an index picture easier and can be increased in image picking-up and processing speeds, a method for driving the device, and a film scanner applying such a technology.

SOLUTION: A CCD image sensor 30 is constituted in such a structure that the transfer gate electrodes V1(TG1A) and V3(TG3A) on one photoelectric conversion element line which is the closest to a horizontal transfer CCD 36 of two-dimensionally arranged plural photoelectric conversion elements 32 or on its adjacent two photoelectric conversion element lines are independently controlled separately from the other photoelectric conversion elements. The image sensor 30 is mounted on a film scanner and, at the time of performing a a picture reading process (at the time of scanning index) for acquiring an index picture, the sensor 30 is functioned as a linear image sensor and, at the time of performing a proper image picking-up process for acquiring high-quality pictures at every frame, the sensor 30 is functioned as an areal image sensor.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention reads the image information which starts a CCD imaging device and its actuation approach, and a list at a film scanner, especially is recorded on the photographic film [finishing / development] with an image sensor, changes this into electronic image data, and relates to the suitable CCD imaging device for record and the film scanner which can be reproduced and its actuation approach, and a list at a film scanner.
[0002]
[Description of the Prior Art] The image currently recorded on the photographic film [finishing / development] is reac in the former with a CCD line sensor (linear image sensors), the image is changed into electronic image data, it outputs to image table equipments, such as a television set, or the film scanner recordable on a record medium etc. as an image data file is proposed (JP,8-147326,A). For example, in the case of the film corresponding to 24mm advanced photo system (APS), the photographic film is contained in the film cartridge which has protection-from-light structure, and it is necessary to pull out a film from a cartridge to check the image currently recorded on the photographic film [finishing / development]. This film scanner corresponding to APS is equipped with the device (film loading device) which pulls out a film from a film cartridge, and the method of reading an image with a CCD line sensor is adopted, conveying a film.
[0003]
[Problem(s) to be Solved by the Invention] Usually, in this kind of film scanner, the reading conditions of each coma image are detected, the image of all coma is scanned at high speed at the time of film loading, all coma is scanned, applying amendment to an image pick-up system based on the reading conditions concerned anew after that, the small size image (thumbnail image) which thinned out the number of pixels moderately and processed it about each coma is acquired, and the index image which comes to arrange these in the shape of a matrix is created.
[0004] Thus, in the case of the conventional film scanner using a line sensor, there is an advantage that an index image can be created at high speed, but about loading (this image pick-up processing) of the independent image for every frame, if a film is not scanned, there is a fault that an image cannot be checked. Moreover, in order to decide reading conditions, it is necessary to acquire image information in advance, and displaying the image of a frame takes time amount.
[0005] This invention was accomplished in view of such a situation, and while offering the CCD imaging device whicl can attain improvement in the speed of this image pick-up processing, and easy-ization of creation of an index image, and its actuation approach, it aims at offering the film scanner which applied this technique.
[0006]
[Means for Solving the Problem] The vertical transfer way which makes the signal charge which two or more optoelectric transducers were arranged two-dimensional, and was accumulated in each optoelectric transducer transmit to perpendicularly it meets in the direction of a train of said array in order that this invention may attain said object, In the CCD imaging device equipped with the level transfer way which meets the line writing direction of said array in th signal charge sent out from said vertical transfer way and which is made to transmit horizontally The transfer gate electrode which makes the signal charge accumulated in one line or the adjoining optoelectric transducer for two lines which meets said horizontal direction among said two or more optoelectric transducers transmit to said vertical transfer way It is prepared apart from the transfer gate electrode which makes one line or the adjoining signal charge

accumulated in the optoelectric transducer of an except by two lines concerned transmit to said vertical transfer way. It is characterized by having the structure which can control impression of a read-out pulse voltage independently to said one line or adjoining transfer gate electrode of the optoelectric transducer for two lines.

[0007] According to this invention, only the signal charge of the one line or the optoelectric transducer for two lines concerned can be read by impressing a read-out pulse voltage to the transfer gate electrode of one line or the adjoining optoelectric-transducer line for two lines of the optoelectric transducers by which the flat-surface array was carried out, and not impressing a read-out pulse voltage to the transfer gate electrode of other optoelectric transducers. On the other hand, a signal charge can be read from all optoelectric transducers like the conventional area image sensor by [the] giving a read-out pulse voltage to the transfer gate electrode of all optoelectric transducers, without distinguishing said one line or adjoining photoelectrical changeover component line for two lines from other optoelectric transducers. Thus, since it enabled it to control independently one line or the adjoining transfer gate electrode of the optoelectric-transducer line for two lines apart from other transfer gate electrodes, one CCD imaging device can be used as linear image sensors, or it can be used as an area image sensor.

[0008] The vertical transfer way which makes the signal charge which two or more optoelectric transducers were arranged two-dimensional, and was accumulated in each optoelectric transducer transmit to perpendicularly it meets in the direction of a train of said array in order to attain said object according to other modes of this invention, The transfer gate electrode for controlling the transfer gate which makes the signal charge accumulated in said optoelectric transducer transmit to said vertical transfer way, In the actuation approach of the CCD imaging device equipped with the level transfer way which meets the line writing direction of said array in the signal charge sent out from said vertical transfer way and which is made to transmit horizontally Impress a read-out pulse voltage to one line which meets said horizontal direction among said two or more optoelectric transducers, or the adjoining transfer gate electrode of the optoelectric transducer for two lines, and a signal charge is read. The 1st actuation control system concerned as which the CCD imaging device concerned is operated as linear image sensors, without [one line or / adjoining] giving a read-out pulse voltage to the transfer gate electrode of the optoelectric transducer of an except by two lines, The 2nd actuation control system as which a signal charge is read from all optoelectric transducers also including said one line or adjoining optoelectric transducer for two lines, and the CCD imaging device concerned is operated as an area image sensor, It is characterized by using one CCD imaging device as linear image sensors by switch ******, or using it as an area image sensor.

[0009] Moreover, the film scanner concerning this invention as a 1 utilization mode of the CCD imaging device of this invention A film transport means to convey a photographic film [finishing / development], and the light source which illuminates said photographic film, It is the CCD imaging device which picturizes the image currently recorded on the photographic film illuminated by said light source, and is changed into an electronic picture signal. The vertical transfe way which makes the signal charge by which two or more optoelectric transducers were arranged two-dimensional, anc were accumulated in each optoelectric transducer transmit to perpendicularly it meets in the direction of a train of said array, The level transfer way which meets the line writing direction of said array in the signal charge sent out from said vertical transfer way and which is made to transmit horizontally, The transfer gate electrode which makes the signal charge accumulated in one line or the adjoining optoelectric transducer for two lines which **** and meets said horizontal direction among said two or more optoelectric transducers transmit to said vertical transfer way It is prepared apart from the transfer gate electrode which makes one line or the adjoining signal charge accumulated in the optoelectric transducer of an except by two lines concerned transmit to said vertical transfer way. The CCD imaging device which has the structure which can control impression of a read-out pulse voltage independently to said one line or adjoining transfer gate electrode of the optoelectric transducer for two lines, Impress a read-out pulse voltage to index image creation time to one line which meets the line writing direction of said array among said two or more optoelectric transducers, or the adjoining transfer gate electrode of the optoelectric transducer for two lines, and a signal charge is read. While operating said CCD imaging device as linear image sensors, without [one line concerned or / adjoining] giving a read-out pulse voltage to the transfer gate electrode of the optoelectric transducer of an except by two lines At the time of frame image reconstruction, a signal charge is read from all optoelectric transducers, and it is characterized by having the CCD actuation control means as which the CCD imaging device concerned is operated as an area image sensor.

[0010] According to the film scanner concerning this invention, while an index image is acquirable at high speed, even if it does not scan like a line sensor in the case of this image pick-up for frame image reconstructions, an image can be

acquired, and acquisition of the usual frame image can also be accelerated.
[0011]
[Embodiment of the Invention] Hereafter, it explains in full detail about the gestalt of desirable operation of a film scanner in the CCD imaging device applied to this invention according to an accompanying drawing and its actuation approach, and a list. It outlines about the general structure of CCD series first. Drawing 1 is the conceptual diagram showing the structure of the conventional INTARAIN transfer CCD. Although the number of pixels is lessened for convenience and this drawing shows only a single tier, much configurations with the same actual device are arranged ir all directions.
[0012] This CCD series 10 consists of an array of the sensitization pixel 12 which consists of a photodiode, vertical transfer (vertical transfer way) CCD 14 of 4 phase actuation (V1, V2, V3, and V4), and level transfer (level transfer way) CCD 16 of two phase actuation. The 1st phase V1 of the vertical transfer CCD 14 And the 3rd phase V3 The sensitization pixel 12 is formed corresponding to a transfer electrode, and a part in the meantime functions as the control gate (transfer gate) which transmits the signal charge of the sensitization pixel 12 to the vertical transfer CCD 14.
[0013] Where a signal charge is accumulated in the sensitization pixel 12, it is the transfer electrode V1 and V3. Impression of a read-out pulse transmits the signal charge of each sensitization pixel 12 to the vertical transfer CCD 14 in juxtaposition. Next, the signal charge for one line is transmitted to the level transfer CCD 16 by impressing the clock pulse for one period to the vertical transfer CCD 14 (this actuation is called line shift.). Subsequently, the reading output of the signal charge for one line is carried out from the output section by impressing 2 phase clock pulse to the level transfer CCD 16. Hereafter, all the signal charges of the vertical transfer CCD 14 can be read by repeating a level transfer (level read-out) of a line shift and the level transfer CCD 16. In addition, since a clock pulse is given as a polar electrical potential difference of a read-out pulse and reverse, the signal charge of the sensitization pixel 12 does not flow into the vertical transfer CCD 14 between a line shift and level read-out. Read-out of this signal charge is performed within 1 vertical-drive period according to the timing of a vertical driving signal (VD).
[0014] Moreover, in interlace read-out, where a signal charge is accumulated in the sensitization pixel 12, it is the transfer electrode V1. A read-out pulse (field shift pulse) is impressed, and the signal charge of the sensitization pixel 12 of odd lines is transmitted to the vertical transfer CCD 14 in juxtaposition. Next, the clock pulse for one period is impressed to the vertical transfer CCD 14, and the signal charge for one line is transmitted to the level transfer CCD 16 (line shift). Subsequently, 2 phase clock pulse is impressed to the level transfer CCD 16, and the signal charge for one line is read from the output section. Hereafter, reading appearance of all the signal charges of the vertical transfer CCD 14 is carried out by repeating a line shift and level read-out.
[0015] When read-out of a signal charge is completed about the sensitization pixel 12 of odd lines next, it is the transfe electrode V3. A field shift pulse is impressed and the signal charge of the sensitization pixel 12 of even lines is transmitted to the vertical transfer CCD 14 in juxtaposition. Subsequent read-out actuation is the same as that of the case of odd lines. the reading appearance of odd lines -- carrying out -- and the reading appearance of even lines -- carrying out -- if it is carried out at 1 field period, respectively and read-out of even lines is completed, read-out of the same jump (interlace) scan as television scanning will be again performed by [of odd lines] carrying out reading appearance and repeating return and the following above-mentioned actuation in actuation.
[0016] Moreover, although not illustrated, the drain for discharging the superfluous charge (unnecessary charge) generated in each sensitization pixel 12 is formed in CCD series 10. The example of representation is the structure of the vertical mold overflow drain which discharges a charge in the depth direction (the direction of a substrate) of CCD. Next, the structure of the CCD series applied to the gestalt of operation of this invention in comparison with the above-mentioned conventional CCD series is explained.
[0017] Drawing 2 is the conceptual diagram showing the structure of the CCD series concerning the gestalt of operation of this invention. In this drawing, the same sign is given to drawing 1 and a common part. Moreover, although the number of pixels is lessened and is shown like drawing 1 , many sensitization pixels are arranged two-dimensional, for example, the actual device has the number of pixels of 1280x1024. CCD series 20 concerning the gestalt of operation of this invention differs from the CCD series conventional at the point established independently sc that transfer electrode V1A and V3A can control apart from other electrodes about the sensitization pixel line for two lines of the side nearest to the level transfer CCD 16.
[0018] When a sensitization pixel array is a matrix-like square array, in order to acquire the information on the total

color of R, G, and B, independently controllable transfer electrode V1A and V3A are prepared about the sensitization pixel line for two lines on relation with the array pattern of the light filter arranged in the front face of the sensitization pixel 12. However, in a monochrome case, it is sufficient by preparing transfer electrode V1A in which an independent control is possible about the sensitization pixel line for one line nearest to the level transfer CCD 16.
[0019] According to this structure, actuation as an area image sensor can usually be performed like conventional CCD series 10, read-out control of a signal charge can be performed if needed only from said sensitization pixel line for two lines (in a monochrome case, it is one line), and the CCD series concerned can be used as linear image sensors.
Drawing 3 is the conceptual diagram showing the structure of the CCD series concerning the gestalt of other operations of this invention. This CCD series 30 has the honeycomb structure by which it comes to arrange the sensitization pixel 32 two-dimensional the shape of a blow hole of a bee, and, as for the light filter, the so-called array gestalt of a "slanting BEIYA array" is adopted. This honeycomb array structure (in the lines of the sensitization pixel 32 which adjoins mutually) R and B which the array of the sensitization pixel 32 of one line adjoins [only in the abbreviation 1/2 for array spacing of a line writing direction] horizontally to the array of the sensitization pixel 32 of the line of another side in the case of the structure arranged by shifting relatively, The color picture data for an one-point (1 pixel) pixel are obtained from the signal charge of a total of three sensitization pixels 32 of G located in the upper case of these two sensitization pixels 32.
[0020] For CCD series 30, transfer gate TG1A for two lines by the side of the level transfer CCD 36 and TG3A are other transfer gates [TG / TG and / 3] 1. It is constituted so that it may distinguish and can control independently. Moreover, although CCD series 30 concerned consists of a RB line by which R and B are repeated horizontally, and G lines which only G follows the dot order outputted from the output section 37 of the level transfer CCD 36 as the vertical transfer way of R and B and the vertical transfer way of G are prepared independently and it is shown in drawing 4 -- a degree carries out reading appearance and the signal train of a level line is formed in the combination of these two lines (RB line and G lines) as a signal.
[0021] that is, level [by the combination of G lines (G11, G12, G13 --) of RB line (R11, B11, R12, B12 --) of the bottom, and the right above stage of it] on drawing 4 -- signal train R11G11B11G12 -- B1512G11024 of the 1st line It is obtained. It is signal train B21G21R21B22 of the horizontal of the 2nd line by the following RB line (B21, R21, B22, R22 --) and G lines (G21, G22, G23 --) of the right above stage of it. -- R2522G21024 It is obtained.
[0022] The timing chart which shows the actuation approach of CCD series 30 is shown in drawing 5 and drawing 6 , drawing 5 shows the actuation approach in the case of using CCD series 30 concerned as a linear sensor (it is called the linear actuation approach.), and drawing 6 shows the actuation approach in the case of using CCD series 32 concerned as an area sensor (it is called the area actuation approach.).
[0023] As shown in drawing 5 , synchronizing with a vertical driving pulse (VD), a read-out pulse is impressed only to the independent electrode V1 (TG1A) of the sensitization pixel 32 of two lines nearest to the level transfer CCD 36 among the transfer electrodes of CCD series 30, and V3 (TG3A), and reading appearance only of the signal concerned of two lines is carried out by making it not give a read-out pulse to other electrodes. On the other hand, as shown in drawing 6 , synchronizing with a vertical driving pulse (VD), the signal of all the sensitization pixels 32 can be read by [the] impressing a read-out pulse to all the transfer electrodes of CCD series 30.
[0024] In addition, in performing CCD actuation by interlace, as shown in drawing 7 , synchronizing with a vertical driving pulse (VD), a read-out pulse is impressed to the transfer electrode of the sensitization pixel 32 of odd lines, signal read-out of odd lines is performed, a read-out pulse is impressed to the transfer electrode of the sensitization pixel 32 of even lines synchronizing with the following vertical driving pulse (VD), and it performs signal read-out of even lines. The same signal read-out as television scanning becomes possible by performing such read-out of odd lines / even lines by turns.
[0025] Next, the example which applied the CCD series concerning the gestalt of operation of this invention explained by drawing 2 or drawing 3 to the film scanner is explained. As shown in drawing 8 , this film scanner 40 has an abbreviation rectangular parallelepiped configuration, and the tray 44 and electric power switch 45 for film cartridge 42 insertion are formed in that front face. A tray 44 has the structure in which attitude actuation is possible in a cross direction, and, thereby, loading and blowdown of a film cartridge 42 are performed.
[0026] The keypad 46 equivalent to an input control unit and the television set 48 for image display (monitoring device) are connected to the film scanner 40 through cables 50 and 51, respectively. A keypad 46 has actuation keys, such as the selection key 53 which shows each vertical and horizontal direction, and rise/down key 54, Enter key 55,

the cancellation key 56, and the manipulate signal according to actuation of these keys is inputted into a film scanner 40 through a cable 50. In addition, it is also possible to constitute from a remote control unit (un-illustrating) which may prepare the input control unit equivalent to a keypad 46 in film scanner 40 body, and uses infrared radiation etc.
[0027] Drawing 9 is the perspective view of a film cartridge 42. As shown in this drawing, in the approximately cylindrical cartridge shell 58 in which a film cartridge 42 has protection-from-light structure, the photographic film 62 of the long picture wound around the single spool 60 is contained, and the protection-from-light door 64 is formed at the outlet of a photographic film 62. The door driver which is not illustrated to the hole 66 for door closing motion is inserted, and said protection-from-light door 64 is opened and closed by carrying out revolution actuation of the door driver. A photographic film 62 has the perforation 70 and the magnetic-recording section 72 which show the location o each coma 68, and can record now information, such as photography data for every coma, and a title, as magnetic information. The photographic film 62 by which the development was carried out is kept in the condition of having been contained in the film cartridge 42. Specifically, the film cartridge corresponding to 24mm advanced photo system corresponds to this.
[0028] Drawing 10 is the block diagram showing the internal configuration of a film scanner. This film scanner 40 mainly consists of control-section 86 grades containing the light source 74 for lighting, the motor control section 76 foı film transport, a lens 78, CCD series 30 (or 20), the analog signal processing section 80, the digital-signal-processing section 82, the Records Department 84, and CPU for control. The light source 74 illuminates a photographic film 62 through the infrared (IR) filter 88. The image light which penetrated the film extracts and image formation is carried out to the light-receiving side of CCD series 30 through 90 and a lens 78.
[0029] In each sensitization pixel 32 which has which filter of R, G, and B, the predetermined time charge storage of the optical image by which image formation was carried out to the light-receiving side of CCD series 30 is carried out, and it is changed into the signal charge of R, G, and B of an amount according to the intensity of light. In this way, after the accumulated signal charge is read to the vertical transfer CCD by the read-out pulse of the predetermined period applied from the CCD actuator 92, reading appearance of it is carried out one by one by impression of a vertical transfer pulse and a level transfer pulse.
[0030] The signal outputted from CCD series 30 is added to the analog signal processing section 80, and processing of color separation, a gain adjustment, offset adjustment, etc. is performed here. Gain is applied to a chrominance signal so that a white balance may specifically suit on the base of a negative film (gain adjustment), and channel-range doubling (offset adjustment) of A/D converter 94 is performed.
[0031] After the signal outputted from the analog signal processing section 80 is changed into a digital signal by A/D converter 94, it is added to the digital-signal-processing section 82 of the next step. Although the synchronizing signal is given to CCD series 30, the analog signal processing section 80, and A/D converter 94 from the CCD actuator 92 anı being mentioned later in detail, according to control of a control section 86, line actuation control of CCD series 30 anc area actuation control are performed by the CCD actuator 92.
[0032] The digital-signal-processing section 82 performs predetermined processing based on control of a control section 86 to the signal accepted from A/D converter 94 including a NEGAPOJI inverting circuit, a white balance equalization circuit, a gamma correction circuit, brightness / color-difference-signal generation circuit, etc. That is, the signal accepted from A/D converter 94 is sent and recorded on the Records Department 84, after a white balance is united with a NEGAPOJI reversal process and coincidence and gamma processing is carried out further.
[0033] The image data written in the Records Department 84 is supplied to the signal-processing section 96 for television, is changed into predetermined video signals, such as NTSC system, here, and is outputted to the display (it is hereafter described as a display 48.) of television set 48 and others. In this way, the image currently recorded on the photographic film 62 is displayed in a display 48. Moreover, the image data written in the Records Department 84 can also be outputted to external instruments, such as a personal computer (personal computer) which is not illustrated through the external output interface 98. For example, it becomes possible by connecting a personal computer to the external output interface 98 to suck up the data of the film image read by the film scanner 40 concerned with a persona computer.
[0034] Although structure concrete about a means to convey a photographic film 62 is not illustrated, a film driving means consists of the spool driving shaft which engages with the spool 60 of the film cartridge 42 explained by drawing 9 , a receiving spool which rolls round the photographic film 62 sent out from a film cartridge 42, a motor which gives revolution driving force to said spool driving shaft and receiving spool, a KYAPUSUTA roller, a pinch

roller which are arranged all over a film transport way, etc.
[0035] The photo sensor and magnetometric sensor which are shown with the sign 100 in drawing 10 are formed in the film transport way. The information detected by these sensors is notified to CPU of a control section 86 including the sensor by which a photo sensor detects the perforation 70 of a photographic film 62, and the sensor which detects optical data, such as a bar code currently written in the film edge.
[0036] Said magnetometric sensor is a sensor (magnetic reproducing head) which reads the magnetic information currently recorded on the magnetic-recording section 72 of a photographic film 62, and the information detected with the magnetometric sensor concerned is notified to CPU of a control section 86, and is stored in RAM in a control section 86. Moreover, the data recorded on this RAM are also rewritable, and possible also for writing information in the magnetic-recording section 72 of a photographic film 62 by outputting to the magnetic-recording head which is not illustrated after changing the data in RAM into the signal for magnetic recording.
[0037] A control section 86 generalizes and controls each circuit of this equipment, and has a control program and ROM by which various data storage is carried out. If the image pick-up system of the CCD actuator 92, the throttling control section 104, and motor control-section 76 grade is controlled based on the input signal from a user interface 102, a control section 86 will control writing, read-out processing, etc. in the Records Department 84 on a peach, while performing the operation of exposure value etc. based on the video signal accepted from the digital-signal-processing section 82. In addition, a user interface 102 is used for directions and inputs, such as selection in the mode, and selection of each processing item.
[0038] Next, the actuation of a film scanner which consists of the above-mentioned configuration is explained using th flow chart of drawing 11 . If a film scanner 40 is loaded with a film cartridge 42, the protection-from-light door 64 of a cartridge will be opened, and loading of the film will be carried out. And pretreatment which contains initial setting using the base region of the reader part of a film is performed, and it will be in the condition that a photographic film 62 can be scanned. On the flow chart of drawing 11 , this condition is indicated to be a "initial state" (step S110).
[0039] Here, it is distinguished whether an index image is created (step S112), and processing branches according to the existence of creation of an index image. It can set it as arbitration whether a user's selection is entrusted, a user operates keypad 46 grade, and whether an index image is created wishes the display of an index image.
[0040] When setting out of the purport which creates an index is made, a PURISU can is performed and index creation processing is performed (step S114). Actuation control of CCD series 30 is carried out by the linear actuation approach explained by drawing 5 at the time of PURISU can actuation. CCD series 30 is arranged in the direction in which the feed direction of a film and the level transfer CCD 36 cross at right angles, and the sensitization pixel 32 for two lines nearest to this level transfer CCD 36 functions as linear image sensors. The charge (unnecessary charge) accumulated by other sensitization pixels 32 is thrown away by an overflow drain or electronic shutter ability.
[0041] PURISU can actuation consists of two processes, the 1st scan performed while conveying a photographic film 62 in the direction pulled out from a cartridge, and the 2nd scan which performs a photographic film 62 with HE rewinding in a cartridge. At the time of the 1st scan, the forward direction is fed with a photographic film 62 at high speed (for example, 148.0mm/(second)), and while incorporating image data through two lines concerning the independent control of CCD series 30, coma detection, reading of magnetic information, etc. are performed through optics and a magnetometric sensor 100. At this time, a control section 86 incorporates the RGB code of all coma according to each color from A/D converter 94, the amount of gain adjustments for the amount of offset according to chrominance signal and white balance adjustment is computed, and while memorizing the AWB (automatic white balance) data in which these offset data and the amount of gain adjustments are shown to RAM of CPU for every coma AE (automatic exposure control) data in which the brightness of each coma is shown from the RGB code of each coma are memorized to this RAM.
[0042] At the time of the 2nd scan, a photographic film 62 is conveyed to hard flow at high speed (for example, 74.0mm/(second)) (rewind), and image data is incorporated through two lines which starts the independent control of CCD series 30 again. While controlling the throttling control section 104 based on AE data which acquired the control section 86 with the 1st scan at this time, the CCD actuator 92 is controlled, the charge storage time of CCD series 30 is controlled, and the light exposure for every coma is adjusted. Moreover, based on the AWB data acquired with the 1st scan, a control section 86 controls the CCD actuator 92, and performs adjustment of the amount of offset in the analog signal processing section 80, or gain.
[0043] As for the longitudinal direction of a photographic film 62, infanticide processing of the image information is

carried out by film conveyance speed. Data are added on CCD series 30, after incorporation of image data in case it incorporates, infanticide processing of the direction of a shorter side of a film is carried out, and the image data (thumbnail image data) of the small pixel size which can be displayed as a square pixel is acquired. In this way, the image data for all the acquired coma is arranged in the shape of a two or more coma [every] matrix, and an index image is formed. For example, the image for 20 coma of 4x5 is displayed on the next screen, when a chart example and the image of 21 or more coma are on the screen of a display 48, or a consecutive image is displayed by scrolling. Thus, at the time of a PURISU can, the image for indexes is generable while acquiring information required for each image creation.

[0044] It distinguishes whether it is continuously set as the automatic playback mode after index image display (step S116). When a user chooses an automatic playback mode by a key stroke etc., the image of each coma is automatically reproduced one by one based on the information and the magnetic information on each image which were acquired by said PURISU can (step S118). At this time, CCD series 30 is driven by the area actuation approach explained by drawing 6 , and functions as an area image sensor. Convey a film for every frame, it is made to stop by the position, and the image information of the whole frame is made to output from CCD series 30. In a display 48, one screen display of images concerning this frame image pick-up (this image pick-up) is carried out. In addition, the AE/AWB data acquired by the previous PURISU can may be changed by the image data obtained by this area actuation control.

[0045] If a fixed time amount image is displayed about a frame, it shifts to regeneration of degree coma and sequential per-continuum playback of the image of two or more coma currently recorded on the photographic film 62 is carried out henceforth. Termination of this automatic playback program (slide show) performs rewinding [of a photographic film 62] (step S120). At the time of film rewinding, write-in (rewrite) processing of magnetic information is also performed by a user's selection, and a film cartridge 42 is discharged after rewinding termination (step S122).

[0046] When it is setting out which does not create an index image in step S112, it distinguishes whether subsequently to a manual playback mode it is set up (step S124). A user can choose now as arbitration any of the automatic playback mode which is the playback approach to display a frame every and mentioned above the image which a user makes the sequential selection of the image and manual playback requires for that selection, and this manual playback mode they are.

[0047] When a user chooses an automatic playback mode, it shifts to step S118 mentioned above, and automatic regeneration is performed one by one from the 1st coma eye of a roll film according to a predetermined program (step S118 - step S120). On the other hand, when [that] a user chooses a manual playback mode in step S124, subsequently to the displays 48, such as a television set, it progresses to the processing which performs various setting out required to display an image, assignment of image-processing information, etc. (step S126). At this time, the menu and selections of various setting-out items are displayed on a display 48, and a user performs desired setting out and selection, the input of a parameter, etc., operating keypad 46 grade. In addition, although it shifts to the step S126 concerned also when not choosing automatic playback in step S116 mentioned above, various kinds of inputs can be performed, referring to an index image, when it arrives at the process (step S126) concerned after creating an index image.

[0048] As a setting-out input matter, there is configuration, such as assignment (assignment of a skip coma) of a non-display coma at the time of setting out (above assignment) of an image in every direction and playback, setting out of the interval time amount of continuation playback, setting out (assignment of fade-in fade-out etc.) of the screen change approach, and a background color at the time of playback, etc., for example. About a predetermined item, it is recorded as magnetic information among these input matters at the time of film rewinding (step S120).

[0049] If a user sets a pointer (cursor) by "END" of the actuation box on a screen and pushes Enter key 55 after working an informational input, correction, edit, etc., processing of the process (step S126) concerned will be completed, and it will be distinguished whether subsequently the display for every coma is performed (step S128). A user demands the input of the number of the coma it is subsequently displayed that chooses activation of each coma display (step S130). If a user specifies a coma number, a photographic film 62 will be conveyed to the specified location of a coma number, and the image pick-up (this image pick-up) of the film image concerning the assignment coma number concerned will be performed (step S132). Also in this the image pick-up of this, CCD series 30 is controlled by the area actuation approach explained by drawing 6 . Since in this area actuation the image data for a frame can be acquired at once and it can continue acquiring image data continuously, it is also possible to amend and change the image information for image generation at the optimal value based on the obtained image data. Once this

does not scan a film like linear image sensors, unlike the case where an image output cannot be obtained, an image can be mostly checked on real time. Moreover, good image data is acquirable with utilization of feedback control.
[0050] Especially, if the image pick-up side size of CCD series 30 is exposure area size (13.5mmx24mm) extent corresponding to 24mm advanced photo system, the sufficient number of pixels can be realized and resolution can also be secured enough. Moreover, as drawing 3 explained, when a pixel array is honeycomb structure, there is an advantage that there are also few spatial differences between the lines of G and RB, and they tend to create an image.
[0051] The input of various information also in the case of this frame display, correction, and edit are possible (step S134). For example, directions of the pan(longitudinal direction migration) tilt (lengthwise direction migration) of an image, a revolution of an image, zoom-in / zoom down by the electronic zoom function, assignment of print number of sheets, etc. are possible. A user operates keypad 46 grade, a processing item is chosen (step S134), and predetermined processing is performed according to the selection (step S136).
[0052] Subsequently, it judges whether actuation by the user was completed (step S138). When a user continues actuation, it returns to step S130. If a user inputs the coma number of a migration place, a photographic film 62 will be conveyed in the location of the coma number concerning the assignment, it will move to the specified coma number, and the same processing (step S 132-138) as the above will be performed. After actuation by the user is completed, rewinding [of a photographic film 62] (step S120) and blowdown (step S122) of a film cartridge 42 are performed.
[0053] In the case of a film scanner 40, the light source 47 for lighting is fixed, and since it is arranged in the location where the photographic film 62 was also defined beforehand, an image pick-up object can be dealt with as a quiescence object. Therefore, it is also possible to adopt the interlace actuation explained by drawing 7 in actuation of CCD series 30. In this interlace actuation, there is an advantage that the amount of charges to treat can be increased. It is necessary to change the bearer rate of a film into lengthening the charge storage time, and a control system becomes complicated in the conventional film scanner using this point and linear image sensors.
[0054] According to the film scanner concerning the gestalt of operation of this invention, the transfer control of a film also becomes easy and has the advantage that an index image and the image of this image pick-up can be created quickly easily.
[0055]
[Effect of the Invention] Since it was made the structure which can control independently one line or the adjoining transfer gate electrode of the optoelectric-transducer line for two lines in distinction from other optoelectric transducers among two or more optoelectric transducers arranged two-dimensional according to the CCD imaging device concerning this invention as explained above, one CCD imaging device can be used as linear image sensors, or it can be used as an area image sensor.
[0056] Moreover, while being able to acquire an index image at high speed since a CCD imaging device is used as linear image sensors and the CCD imaging device was used as an area image sensor on the occasion of this image pick-up which acquires a high definition image for every frame in case this CCD imaging device is applied to a film scanner and an index image is acquired (at the time of an index scan), the image of this image pick-up is also quickly acquirable easily.

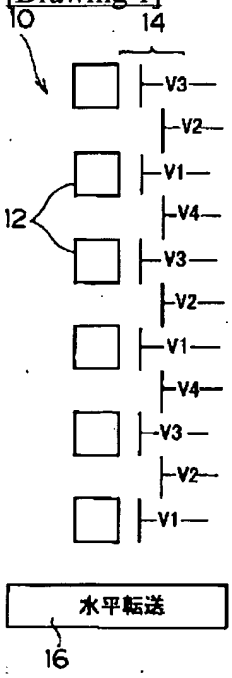
[Translation done.]

* NOTICES *

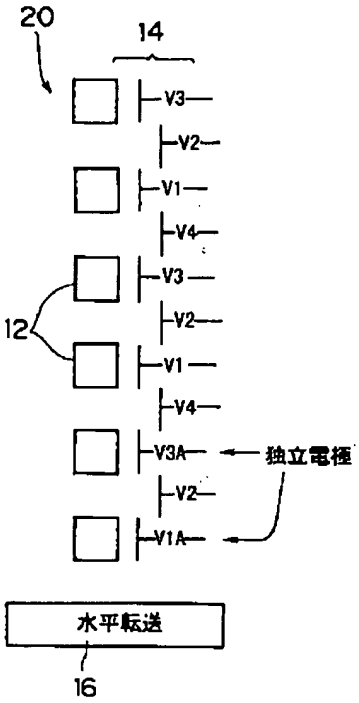
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

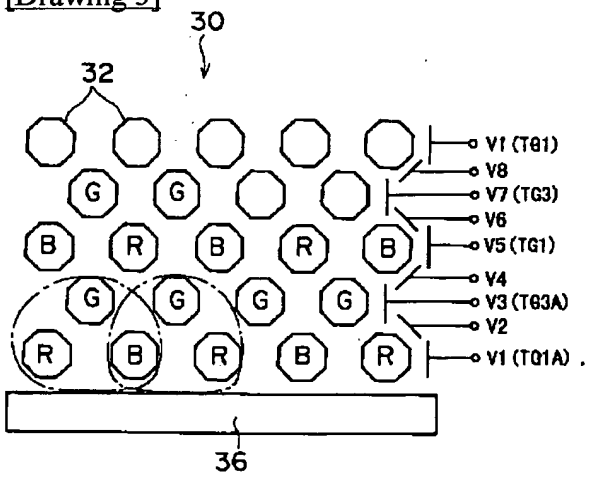
[Drawing 1]



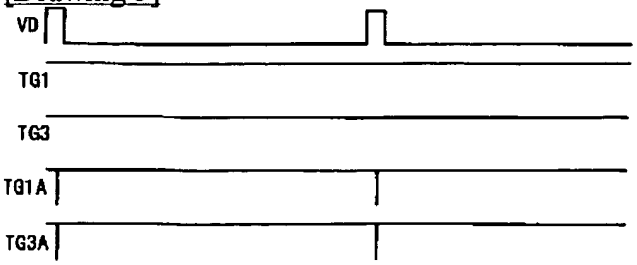
[Drawing 2]



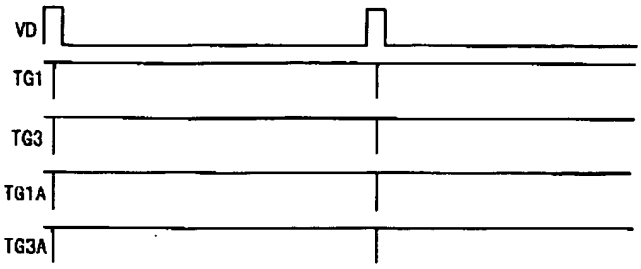
[Drawing 3]



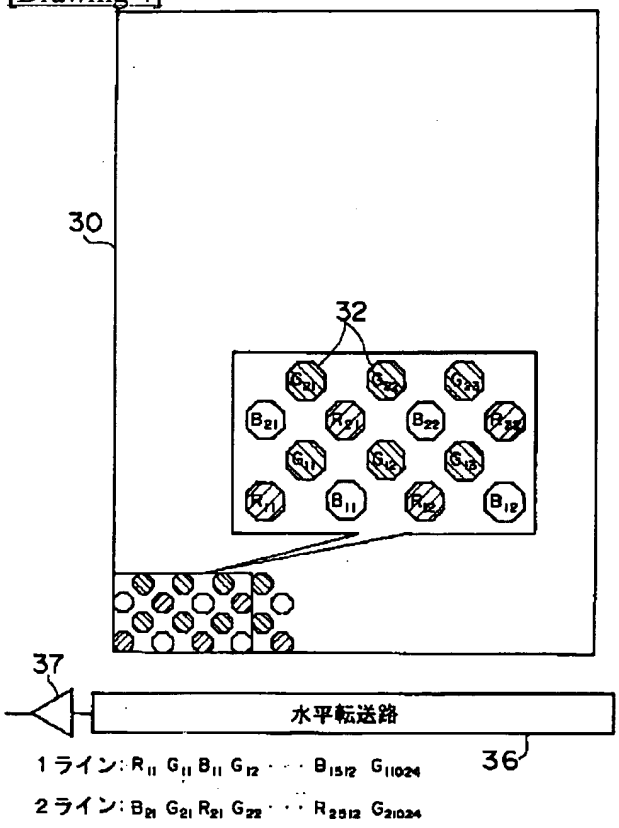
[Drawing 5]



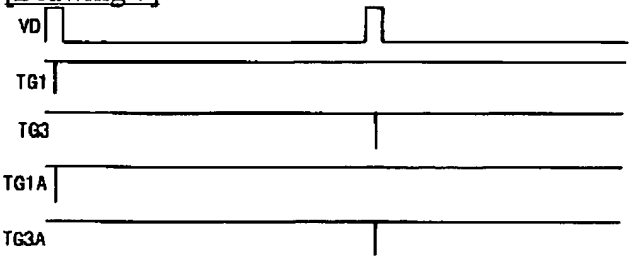
[Drawing 6]



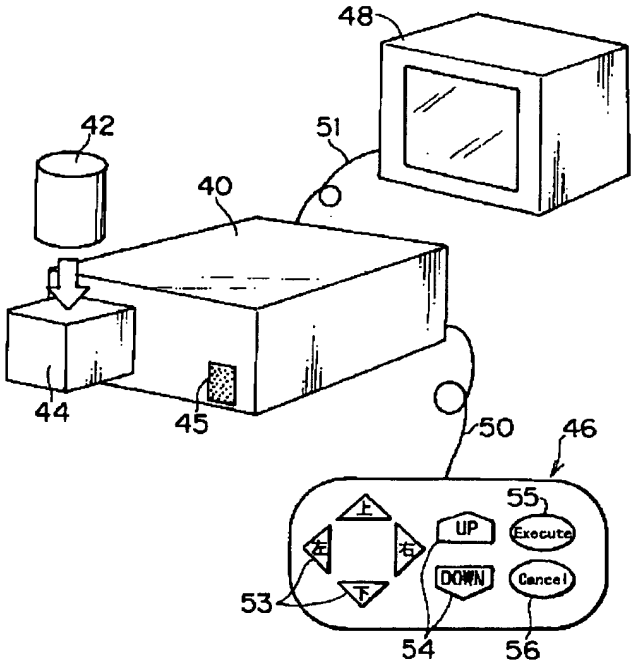
[Drawing 4]



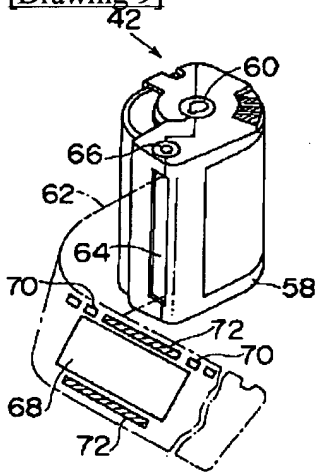
[Drawing 7]



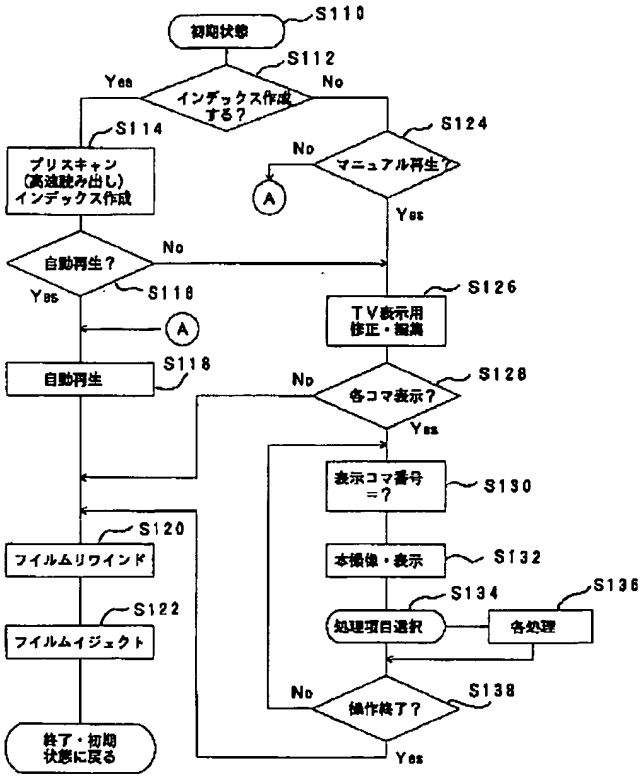
[Drawing 8]



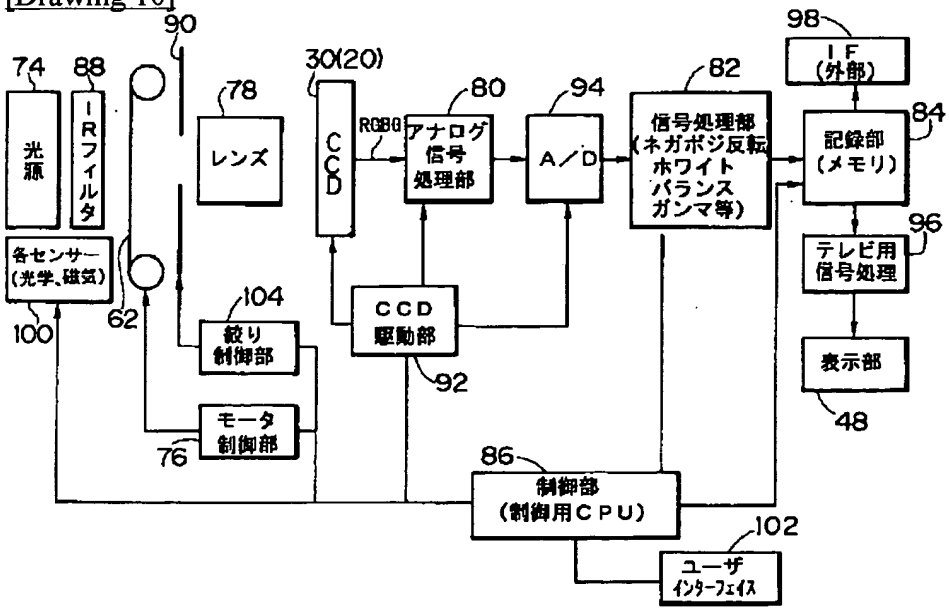
[Drawing 9]



[Drawing 11]



[Drawing 10]



[Translation done.]